Measuring Information Productivity

Paul A. Strassmann, Acting NASA CIO, September 18, 2002

What is Productivity?

$$\text{Productivity} = \frac{\textbf{Output}}{\textbf{Input}}$$

Example of Productivity Gain Calculation – The CEO View

	Period B	Period A	% Changes
Revenue	**$12,000,000**	**$10,000,000**	**+ 20%**
Employment*	**80**	**100**	**- 20%**
Productivity (Revenue/Employee)	**$150,000**	**$100,000**	**+ 50%**

*** 20 employees outsourced**

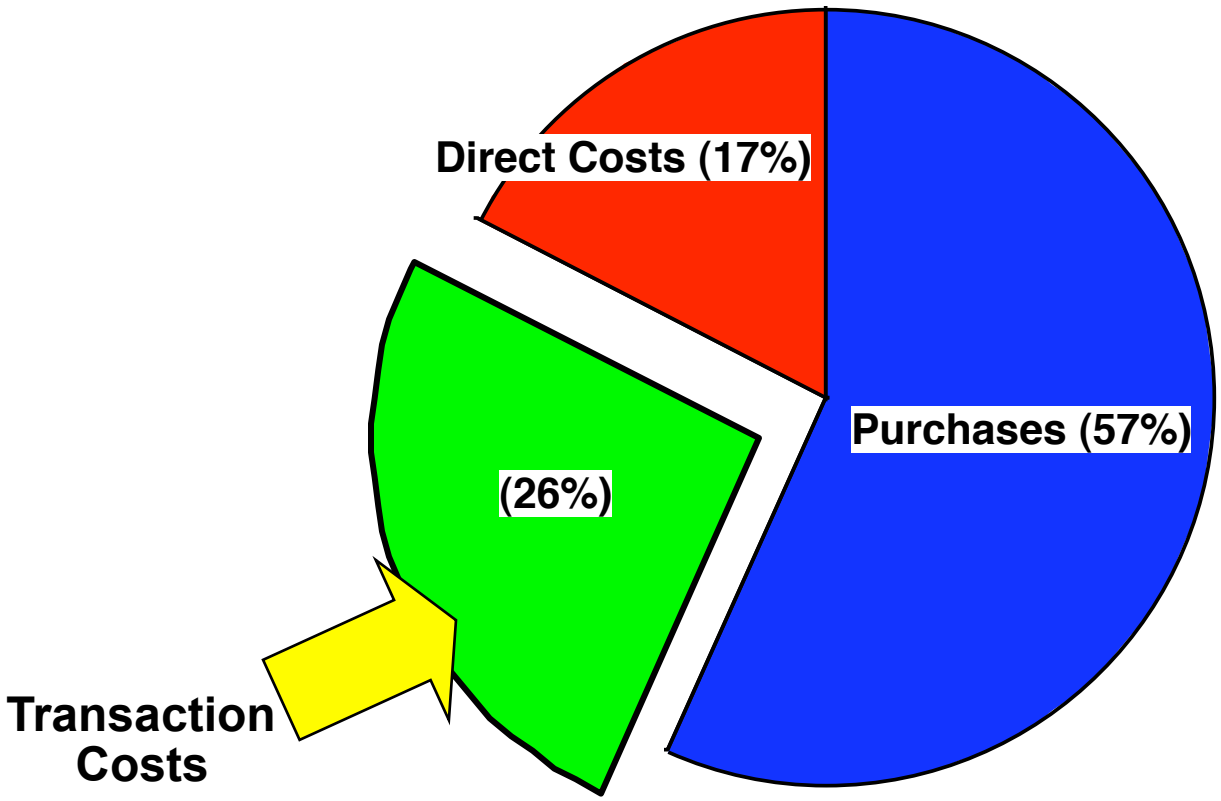
Example of Productivity Gain Calculation – The CFO View

	Period B	Period A	Productivity Gain
Revenue	$12,000,000	$10,000,000	
Purchases	$6,000,000	$4,000,000	
Value-Added	$6,000,000	$6,000,000	
Net Assets Employed	$7,000,000	$5,000,000	
Cost of Capital	9.0%	7.0%	
Economic Value-Added	$5,370,000	$5,650,000	
Employment	80	100	
Productivity (Economic Value-Added/Employee)	$67,125	$56,500	19%

Productivity (Economic Value-Added/Employee)	**$67,125**	**$56,500**

An Information Management View

Cost Structure of a U.S. Manufacturing Corporation



Transaction Costs

- **Organization of Employees and Users**
- **Information Processing**
- **Coordination of Suppliers, Costs of Acquisition**
- **Motivation of Customers**
- **Managing Distributors**
- **Compliance with Regulations**
- **Satisfying Shareholders and Lenders**
- **Fees, commissions, tolls and taxes**
- **Research and development**

Accounting Treatment of Transaction Costs

- **Sales, General & Administrative Costs**
  - **Marketing**
  - **Sales people**
  - **Management**
  - **Advertising**
  - **Training**
  - **I.T. Costs**
- **Research and Development Costs**
- **Reported in audited financial statements**

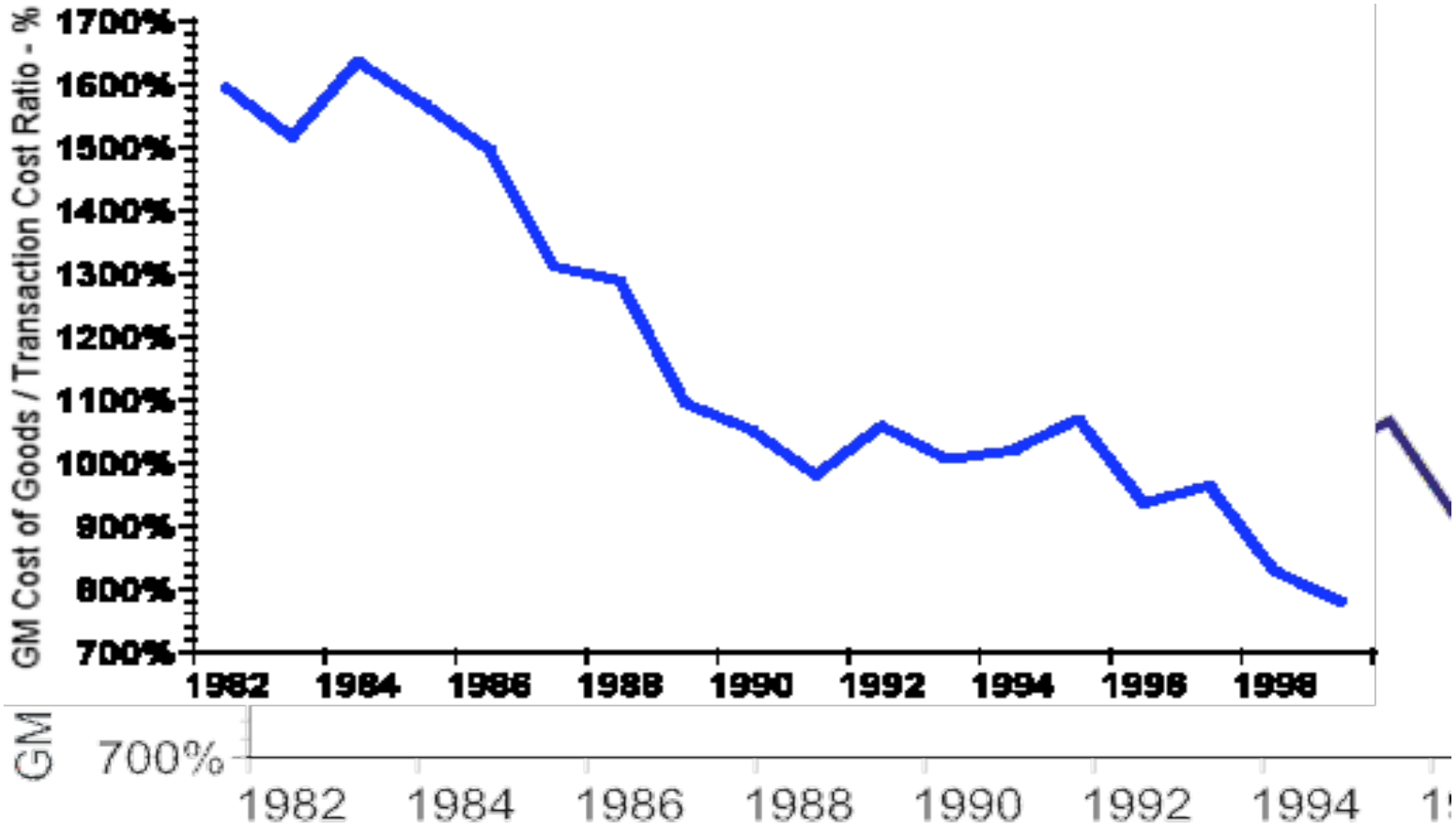
Illustrative Case: 1998 General Motors

	$000s	% of Revenues
Revenues	$161,315,000	100.0%
Purchases	$87,000,000	53.9%
Direct Costs	$31,788,000	19.7%
SG&A + R&D	**$17,330,000**	**10.7%**
Depreciation	$11,978,000	7.4%
Other Operating Expenses	$8,800,000	5.5%
Taxes	$1,463,000	0.9%
Net Income	$2,956,000	1.8%

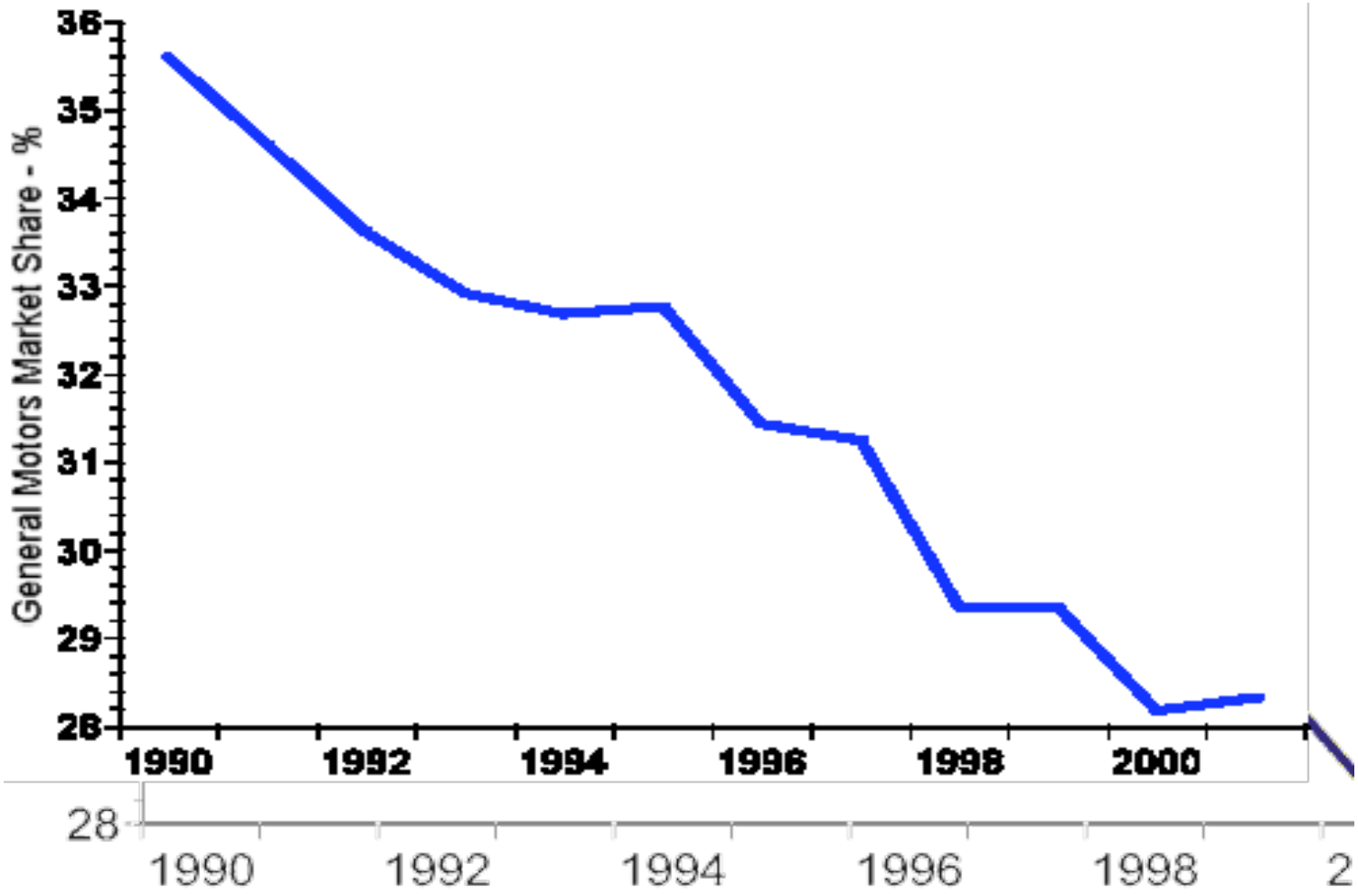
← Transactions

← Information Transaction Costs

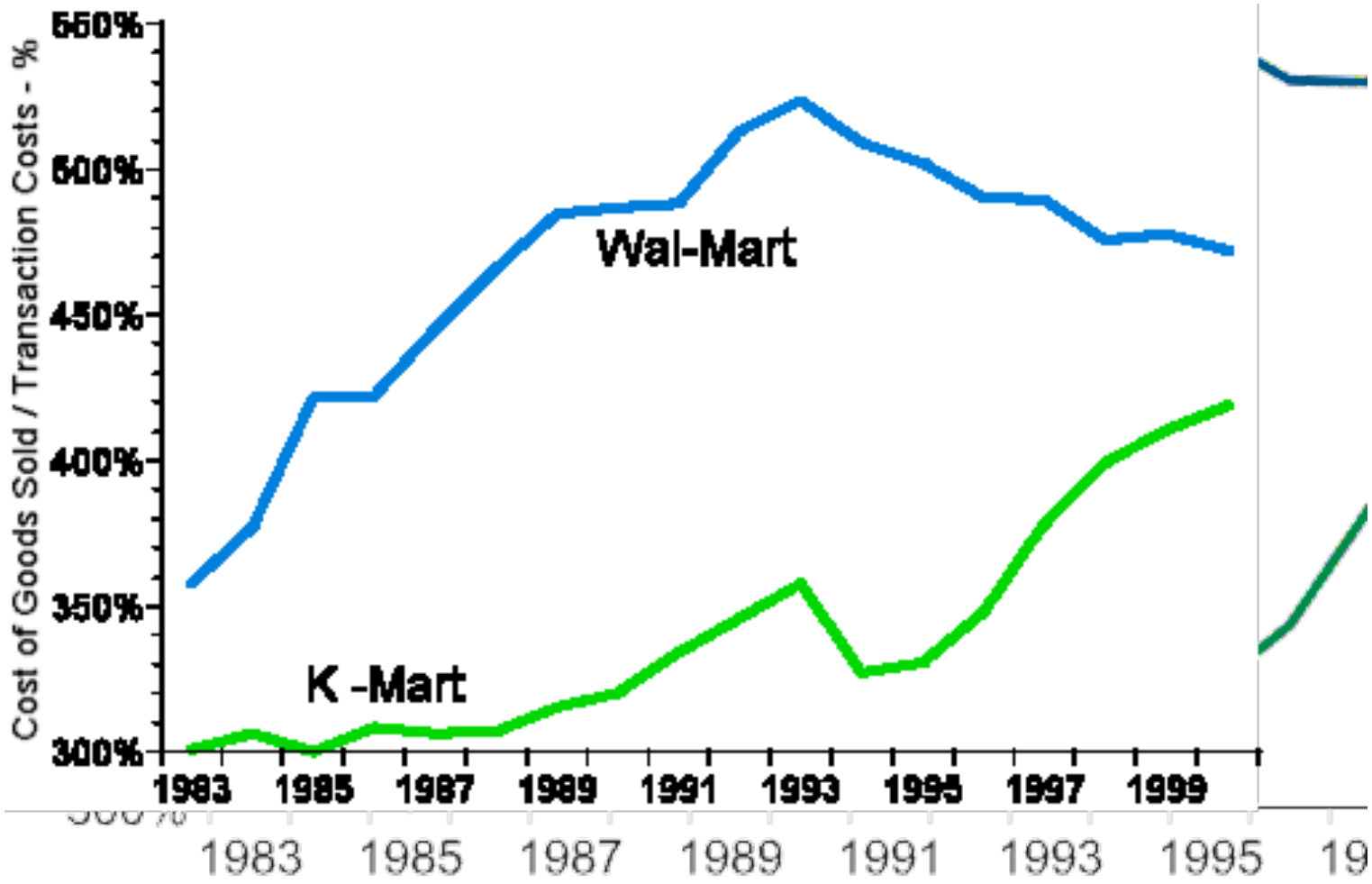
GM Cost of Goods Delivered per Transaction $'s Declined



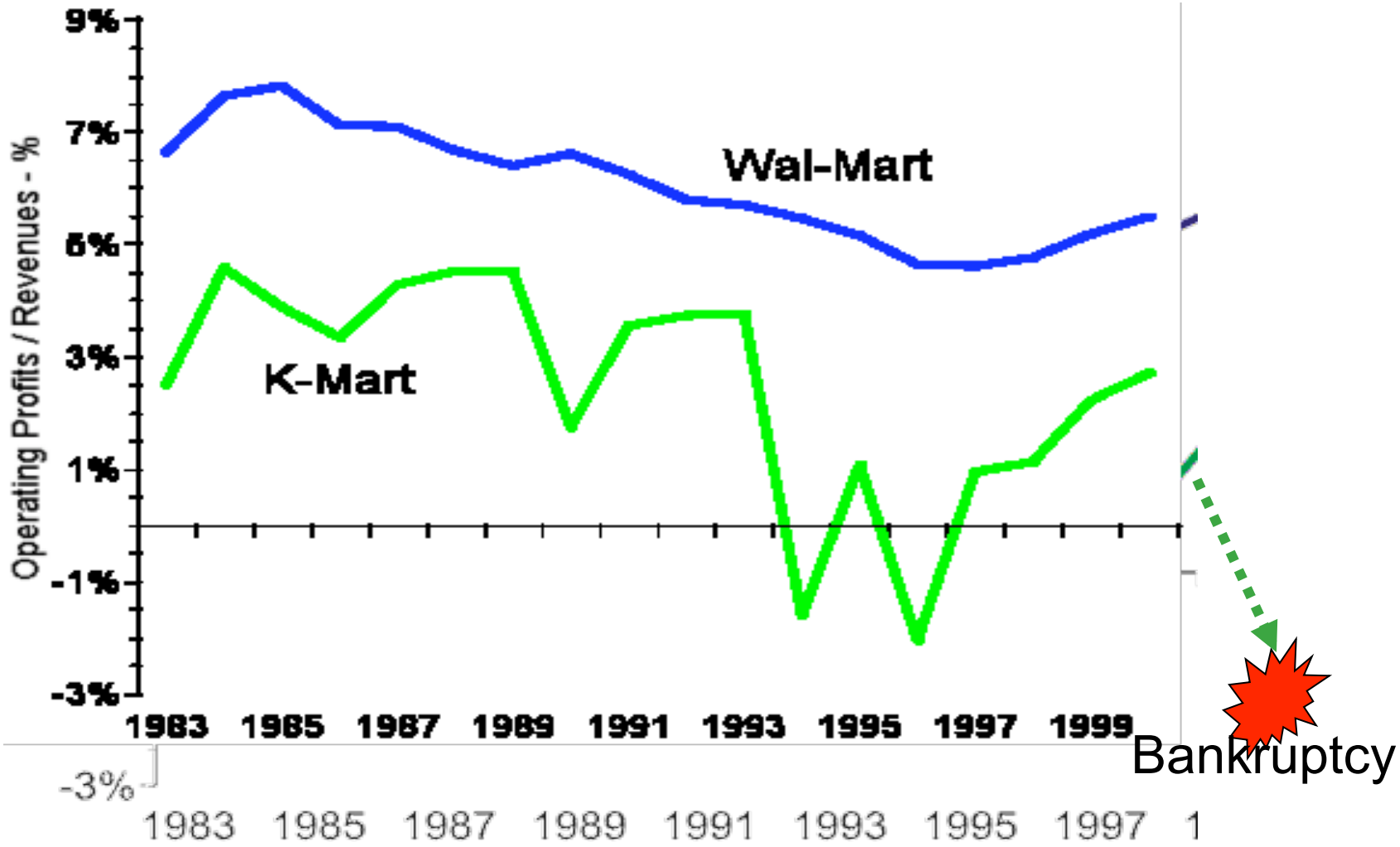
GM Market Share Declined



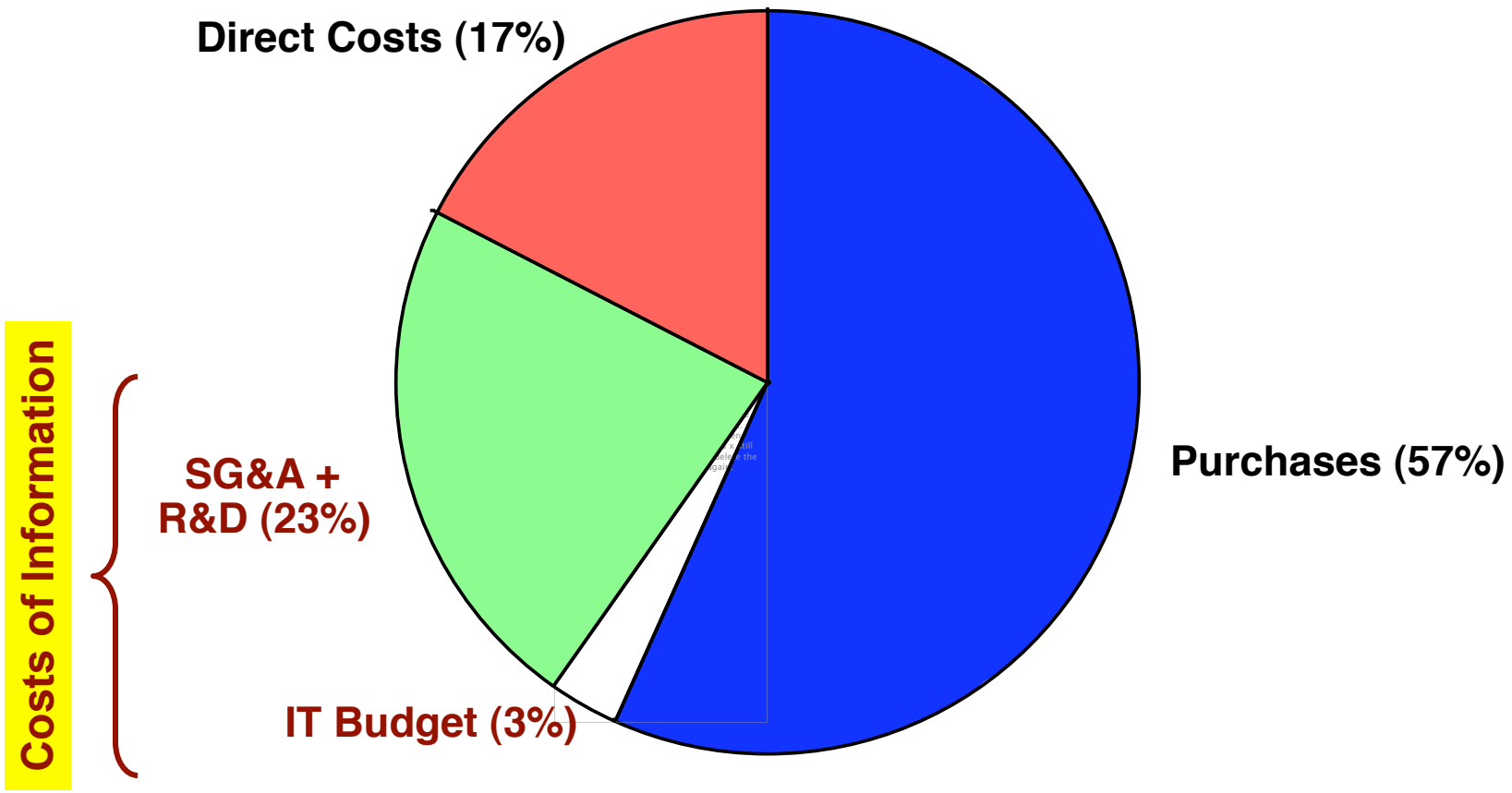
Competition Among Firms with Different Transaction Costs



Operating Results for Firms with Different Transaction Costs



Never Confuse Information Management vs. Info Technology



CIO Must Focus on Productivity of Information

$$\text{Information Productivity} = \frac{\text{Output}}{\text{Input}}$$

$$\text{Info. Productivity} = \frac{\text{Information Value}}{\text{Costs of Information}}$$

SOURCE OF WEALTH

Fundamental Measure in an Information-Based Economy

Information Value = Economic Value-Added (EVA)

Key Equations for Calculating Information Productivity

Economic Value-Added (EVA) =

Accounting Profit – Cost of Shareholder Capital

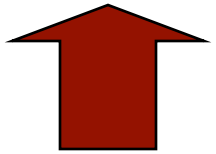
Cost of Shareholder Capital =

Cost of Capital * Shareholder Equity

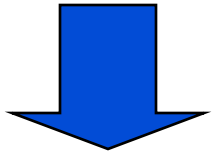
Cost of Capital = Risk-Free Interest + Beta*Risk Premium

How to Increase Information Productivity

Increase Value-Creation by Information



$$\text{Information Productivity}^{®} = \frac{\text{Information Value-Added}}{\text{Information Costs}}$$



Decrease Costs of Information

Productivity Case Study

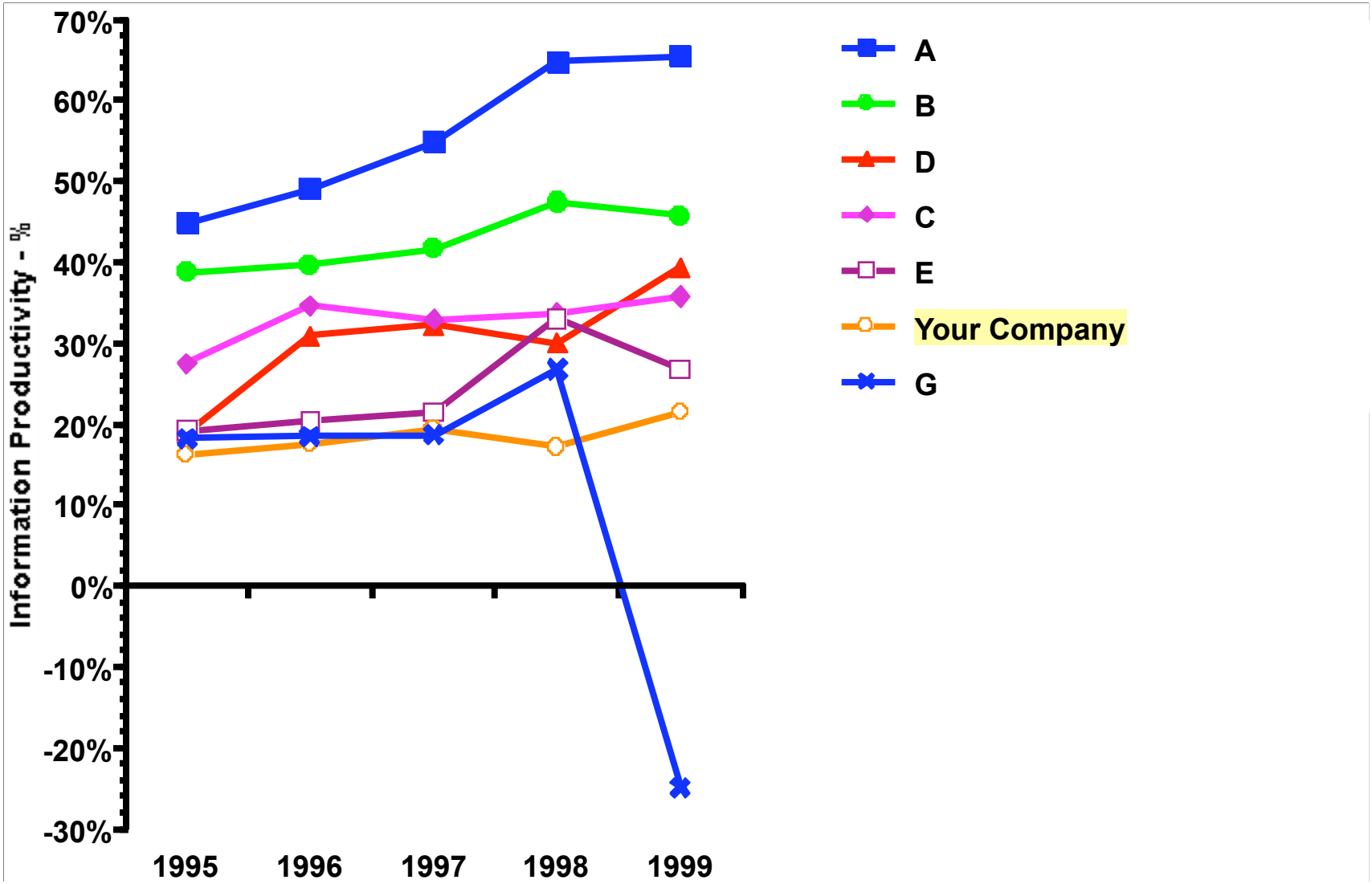
Pick Look-Alike Firms for Making Productivity Comparisons

Company Name	Number of Employees - 1999
Competitor A	57,100
Competitor B	51,656
Competitor C	54,500
Competitor D	97,800
Competitor E	62,300
Competitors F	51,000
Your Company	26,500

Calculate Information Productivity

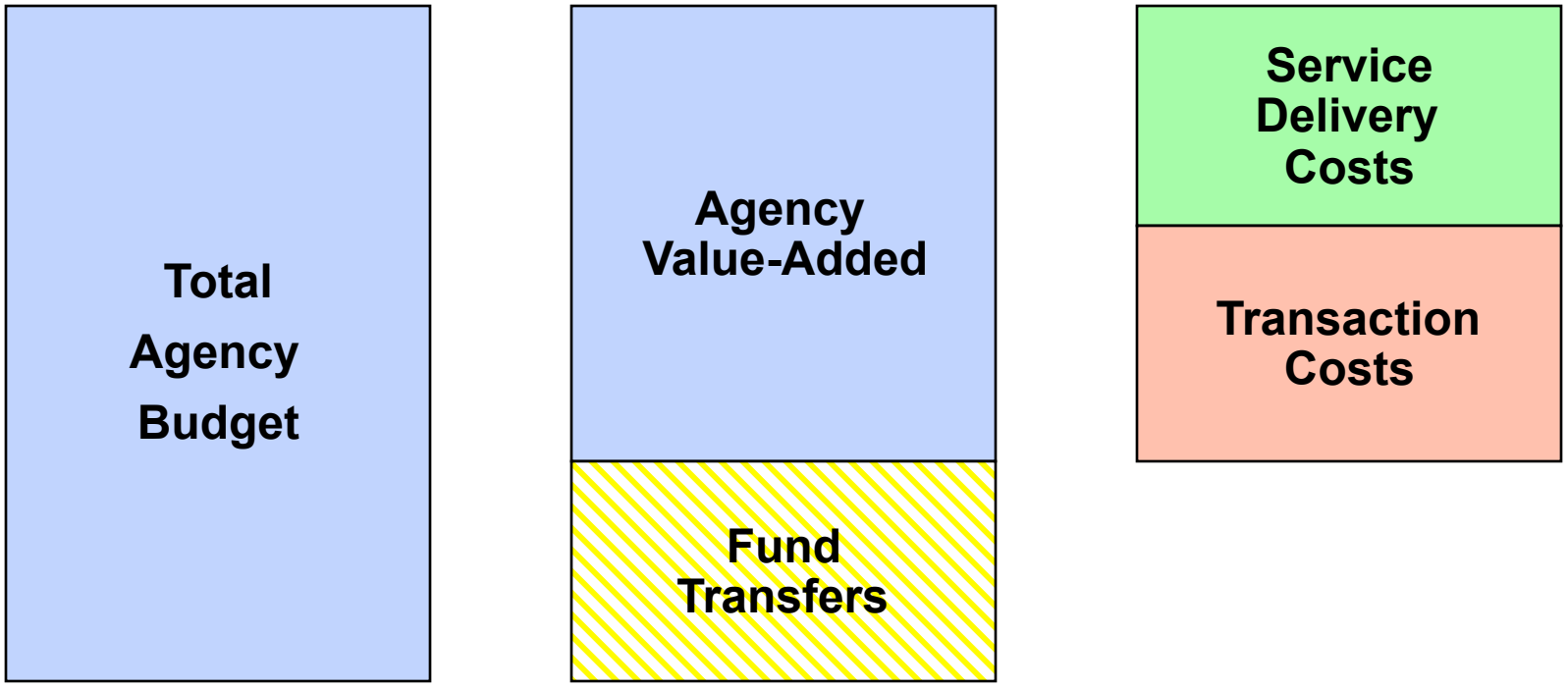
Company Name - All data in 1999 $Millions	Net Income	Cost of Capital - %	Net Financial Capital Employed	Costs of Information Management	Information Productivity
A	$5,891	8.536	$13,242	$7,268	65.5%
B	$2,446	8.08	$7,428	$4,035	45.7%
C	$4,167	8.044	$8,645	$8,830	39.3%
D	$2,110	8.842	$5,165	$4,625	35.7%
F	$3,179	8.284	$8,887	$9,127	26.8%
Your Company	$4,167	8.338	$16,213	$13,103	21.5%
G	$-1,227	7.492	$6,215	$6,780	-25.0%

Compare Historical Performance of Look-Alike Firms



Case Study – Public Sector

How to View Public Sector Costs



Calculating Agency Information Productivity

$$\text{Information Productivity} = \frac{\text{Service Delivery Costs}}{\text{Transaction Costs}}$$

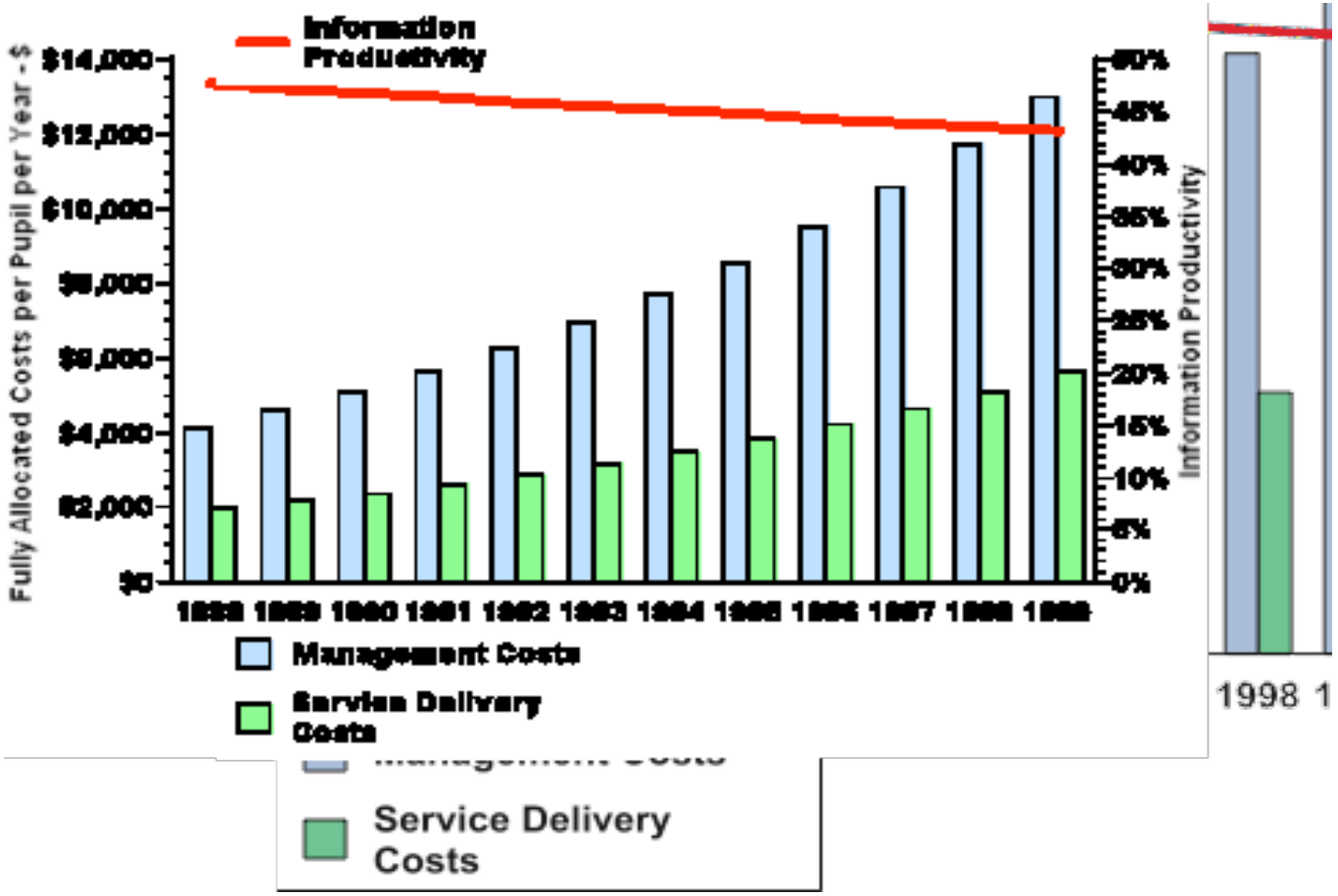
Information Productivity of the New York City Board of Education:*

$$\text{Information Productivity} = \frac{\$\ 1{,}972^*}{\$\ 4{,}135} = 48\%$$

* SOURCE: Strassmann, P.A., The Business Value of Computers, 1990, p.91. In annual Costs per pupil, 1988-1989.

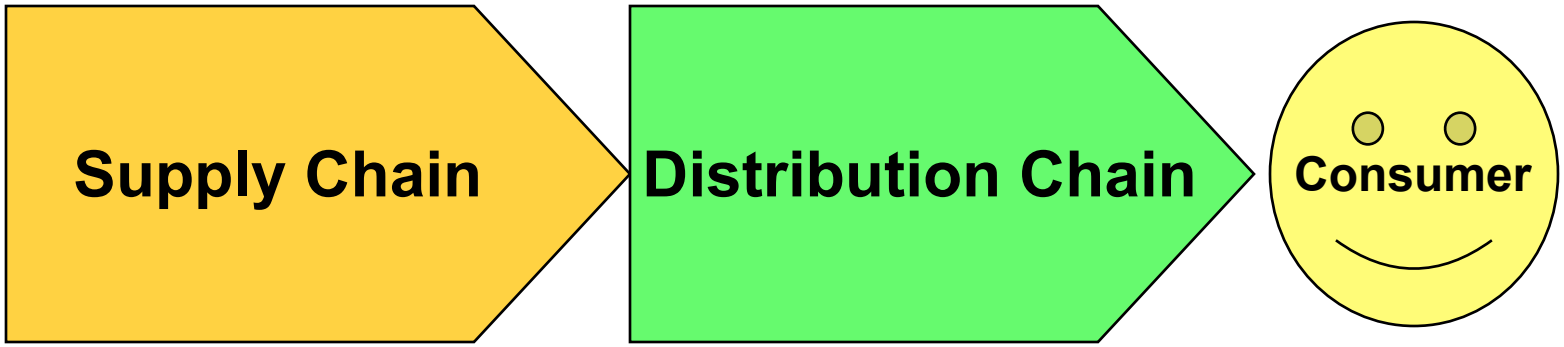
*Actual Teaching Time

Compare Costs and Productivity Trends in Public Sector

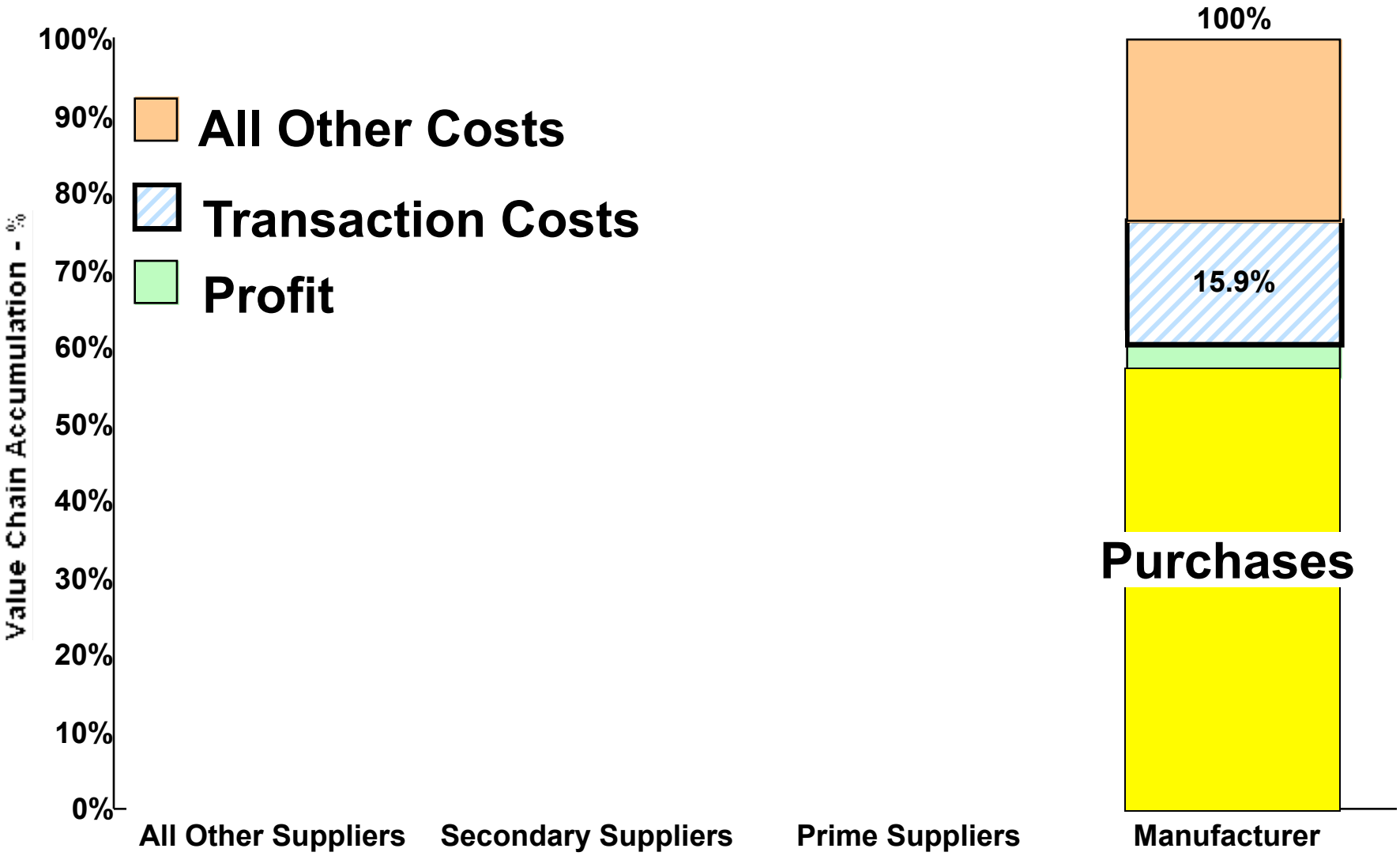


Case Study – Value-Chain Productivity

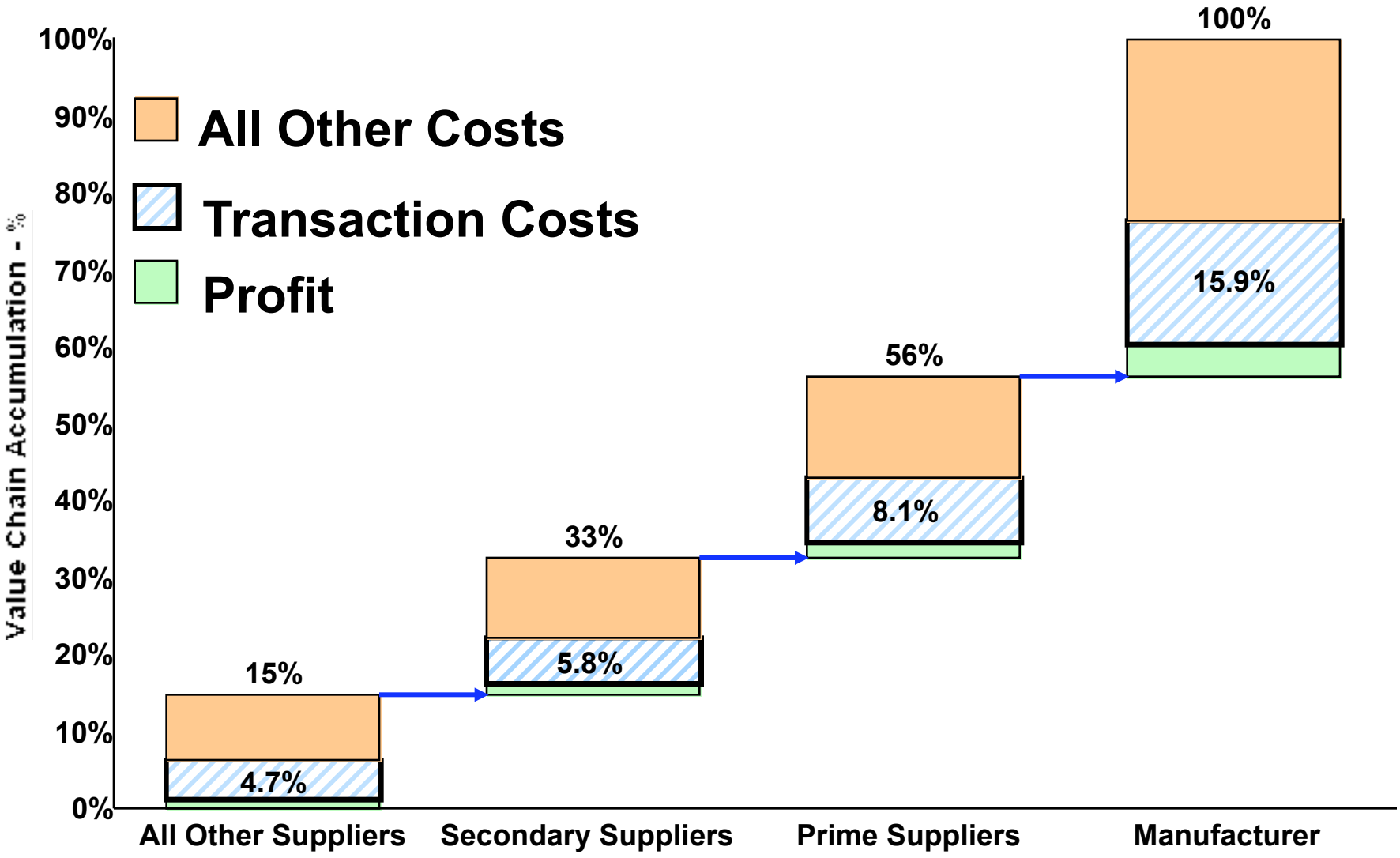
The Real Problem: Transaction Costs in the Value Chain



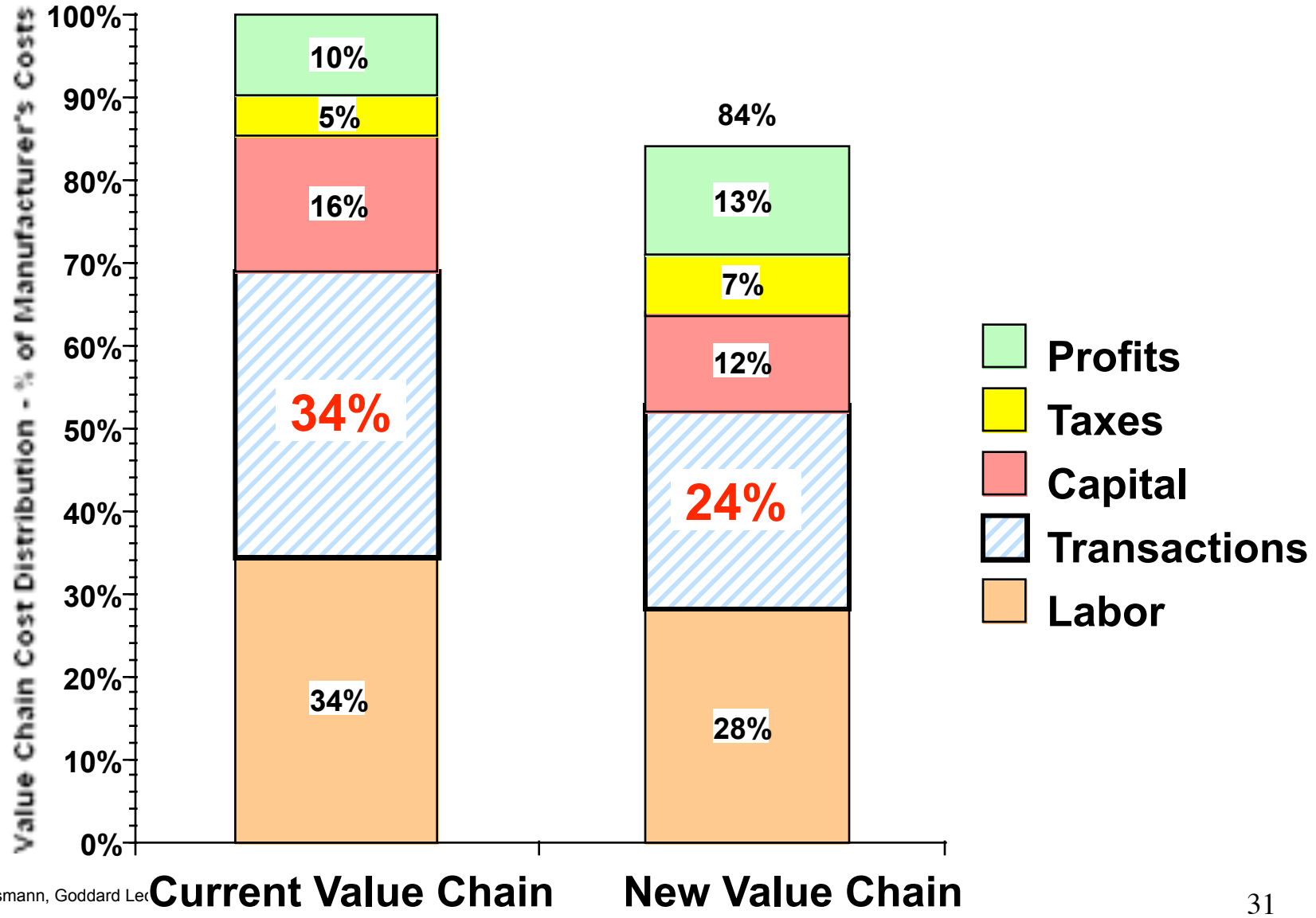
Costs in a Supply Chain



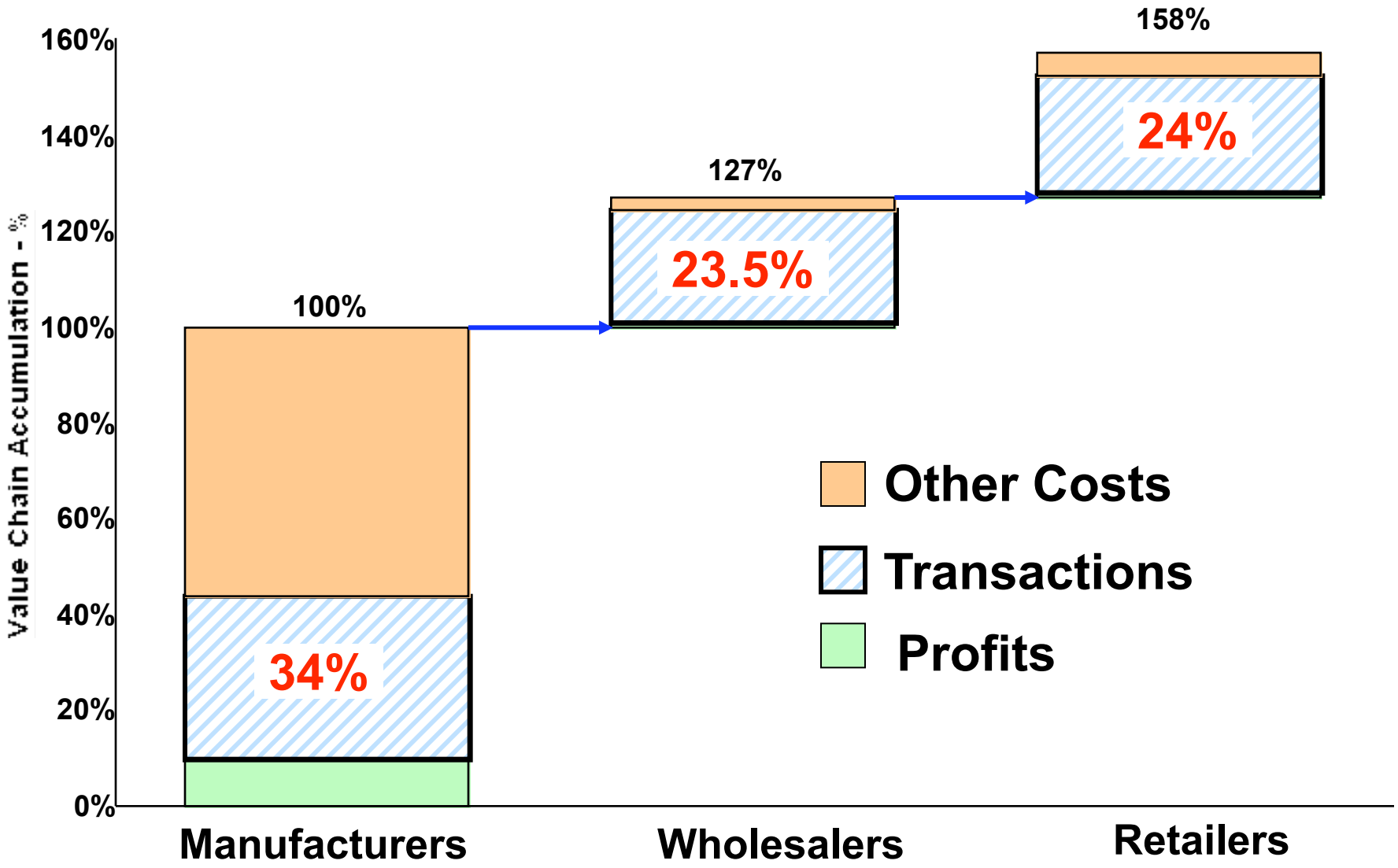
Costs in a Supply Chain



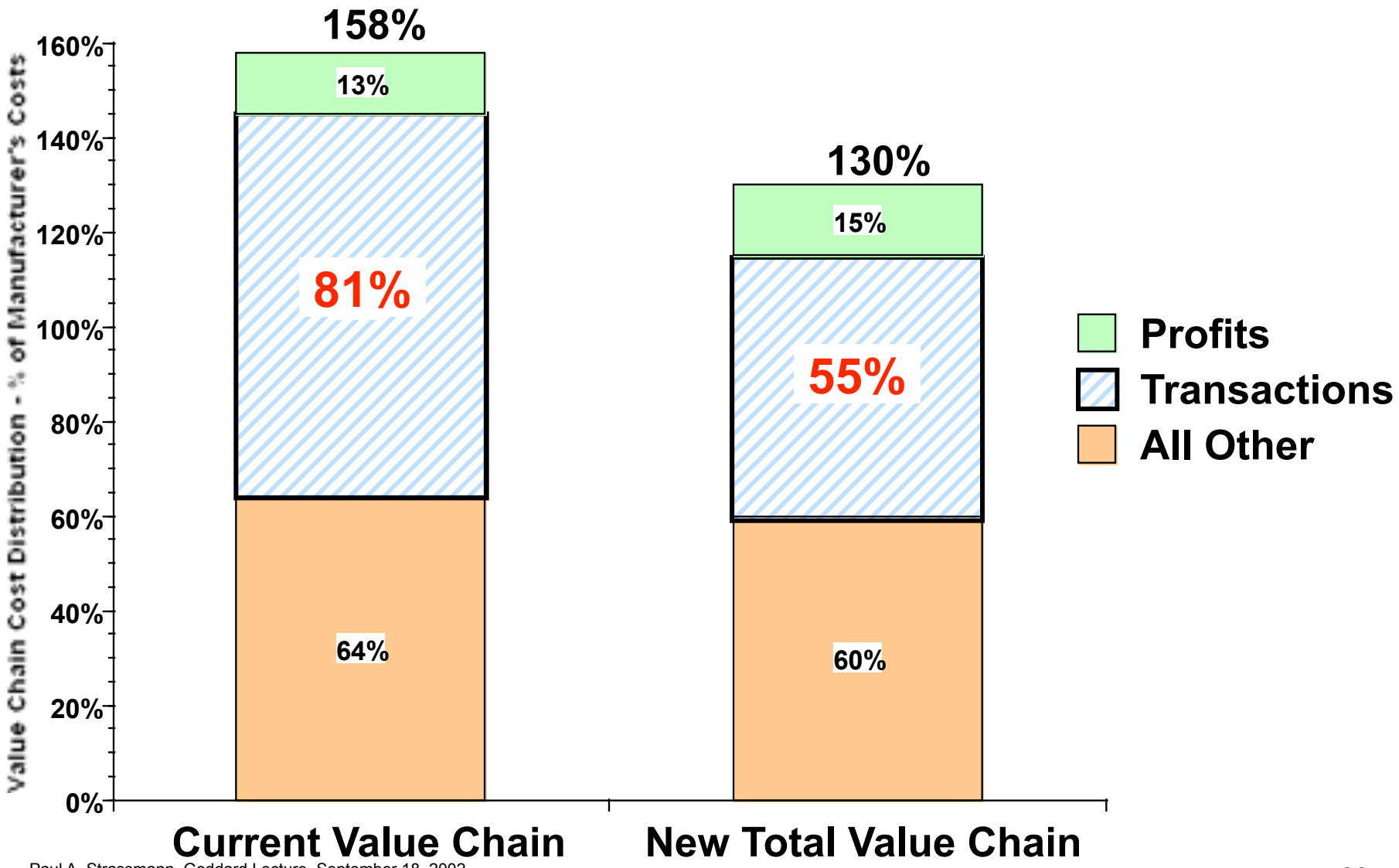
Potential Supply Chain Gains



The Total Value Chain



Potential Total Gains

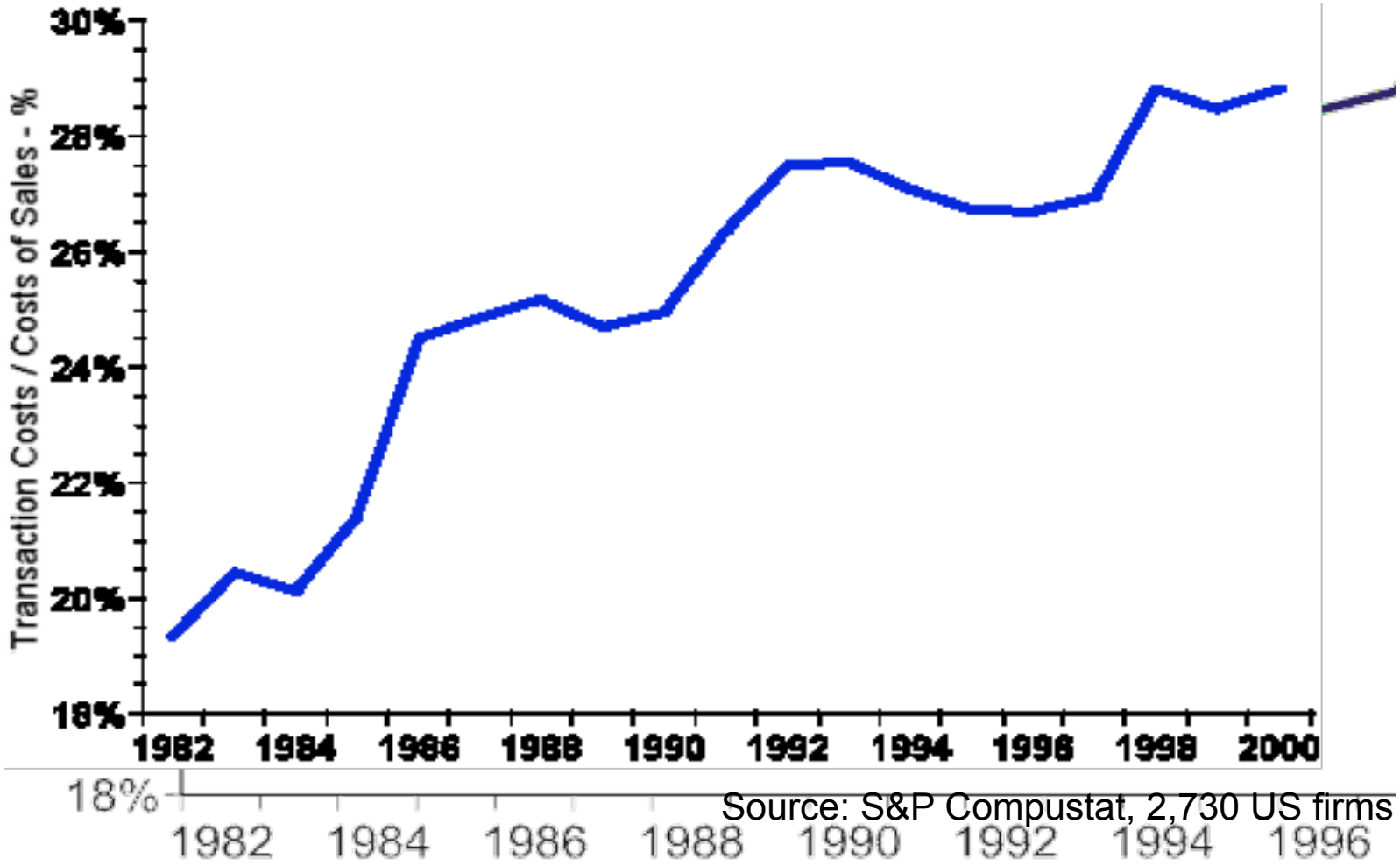


Total Transaction Productivity for the Value Chain

	Cost of Goods	Transaction Costs	Transaction Productivity
Corporate (Agency) Case	79%	16%	497%
Supply Chain Case	34%	34%	100%
Supply + Distribution Chain Case	64%	81%	79%

Supply + Distribution Chain Case 64%

Information Technology Did not Cut Transaction Costs - USA



Source: S&P Compustat, 2,730 US firms

Findings

- Accounting of total transaction costs is necessary for NASA to assess Agency productivity performance.
- Major gains in productivity possible primarily through re-structuring and disintermediation.

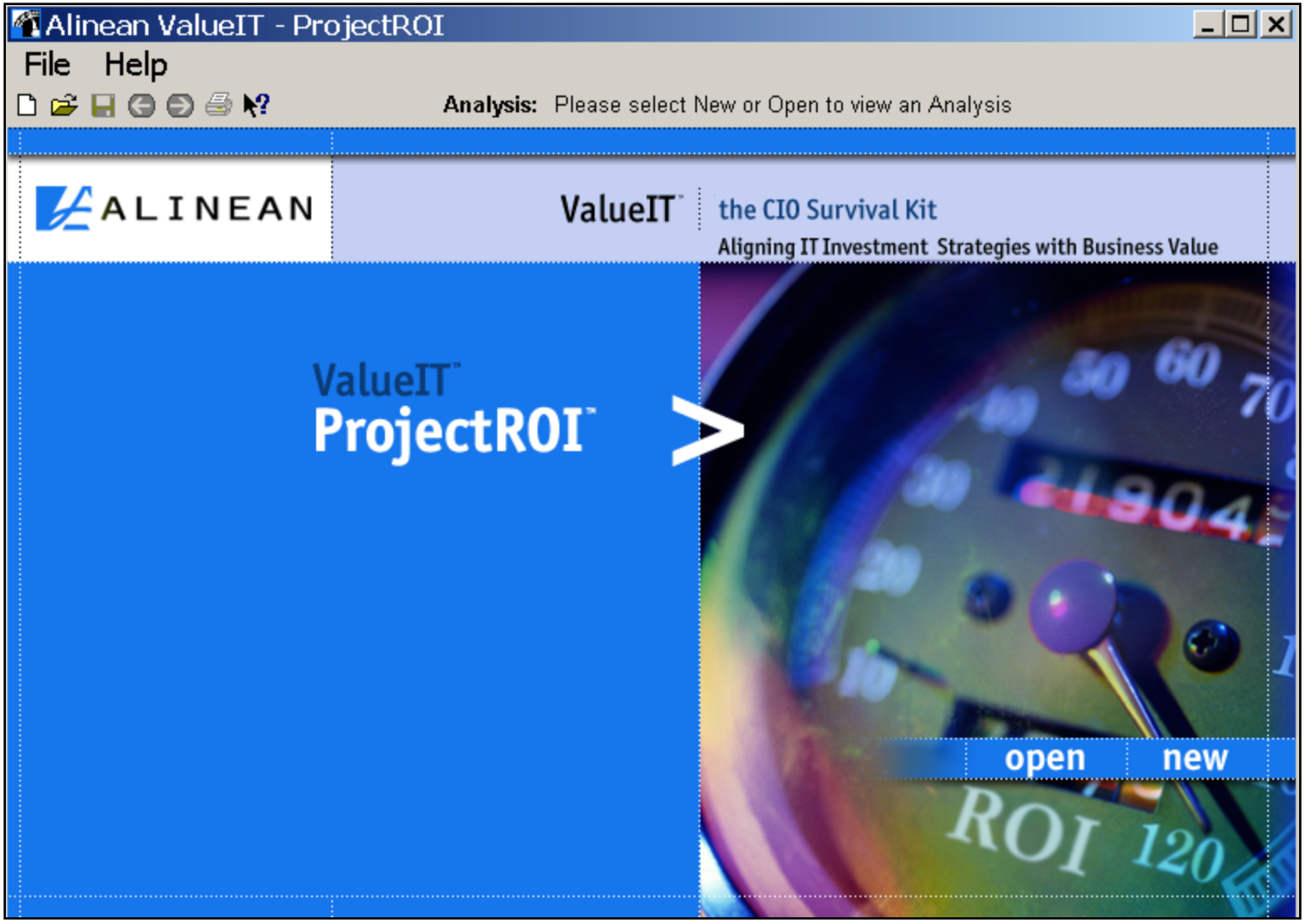
Summary of the “Information Productivity Assessment”

- New metrics needed to assess information
- Information Productivity can be quantified
- Public sector Information Productivity measurements are feasible

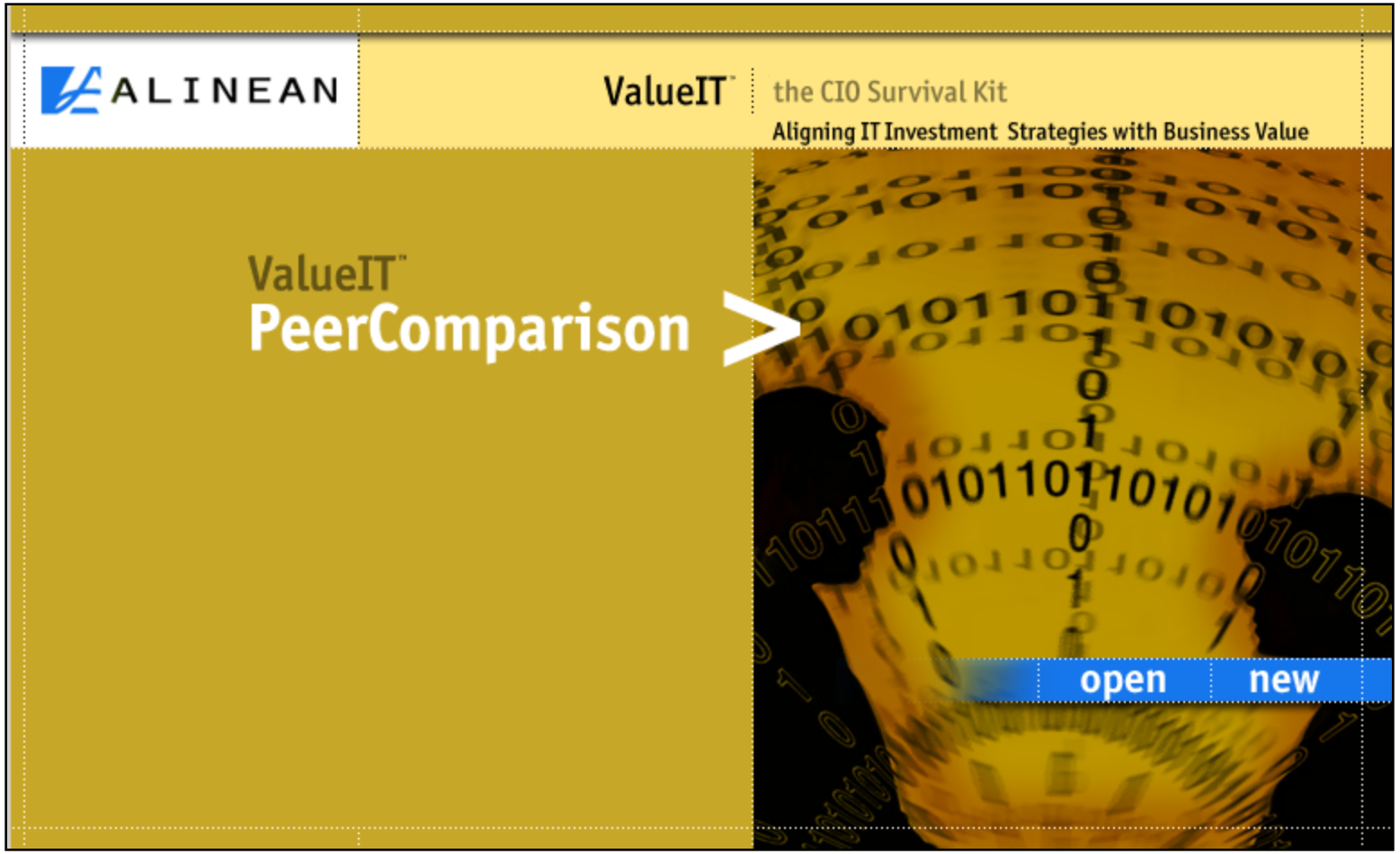
Addendum

Paul A. Strassmann, Alinean Corporation

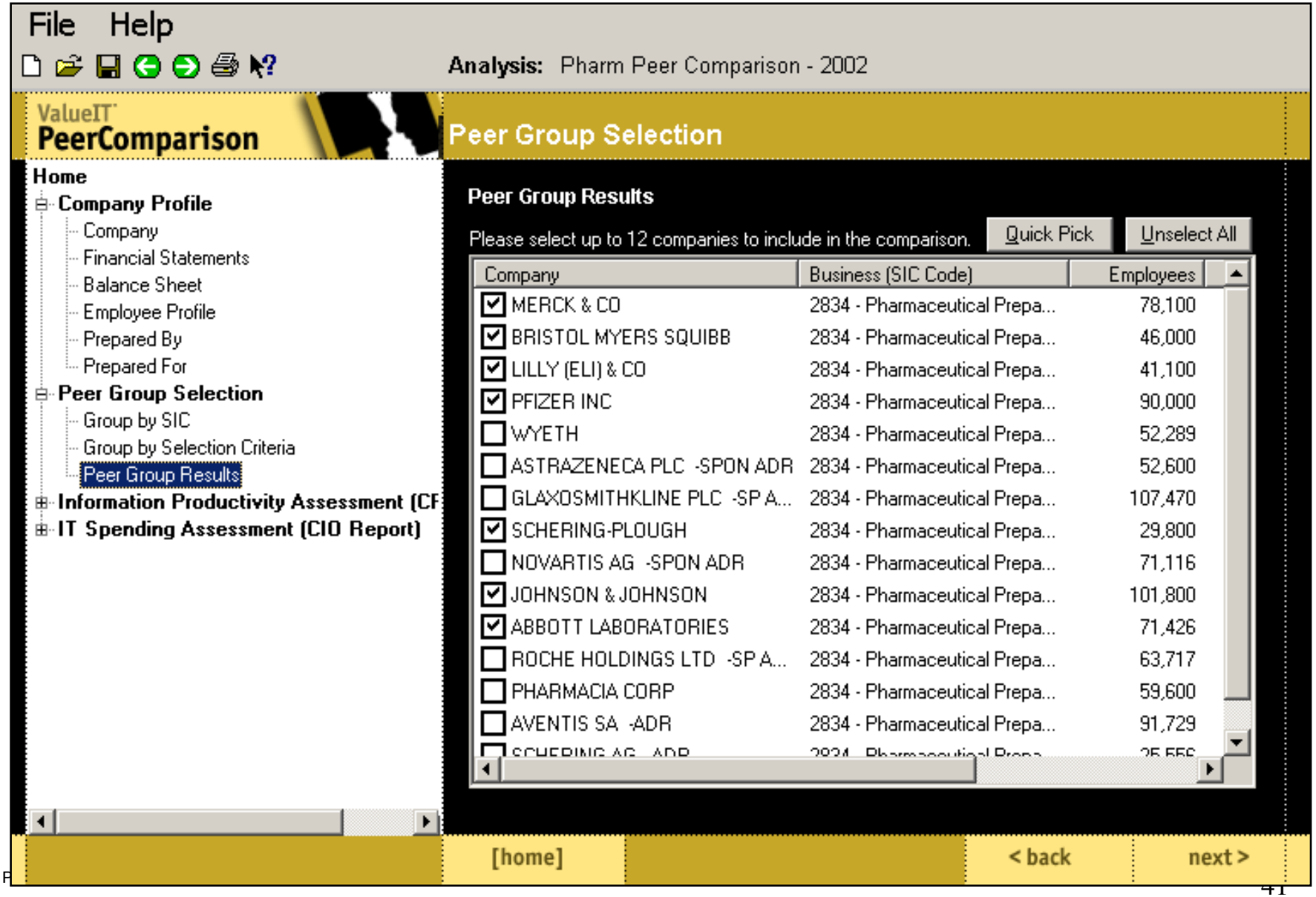
ValueIT Software Based on "The Business Value of Computers" and "Information Productivity" by P.A. Strassmann



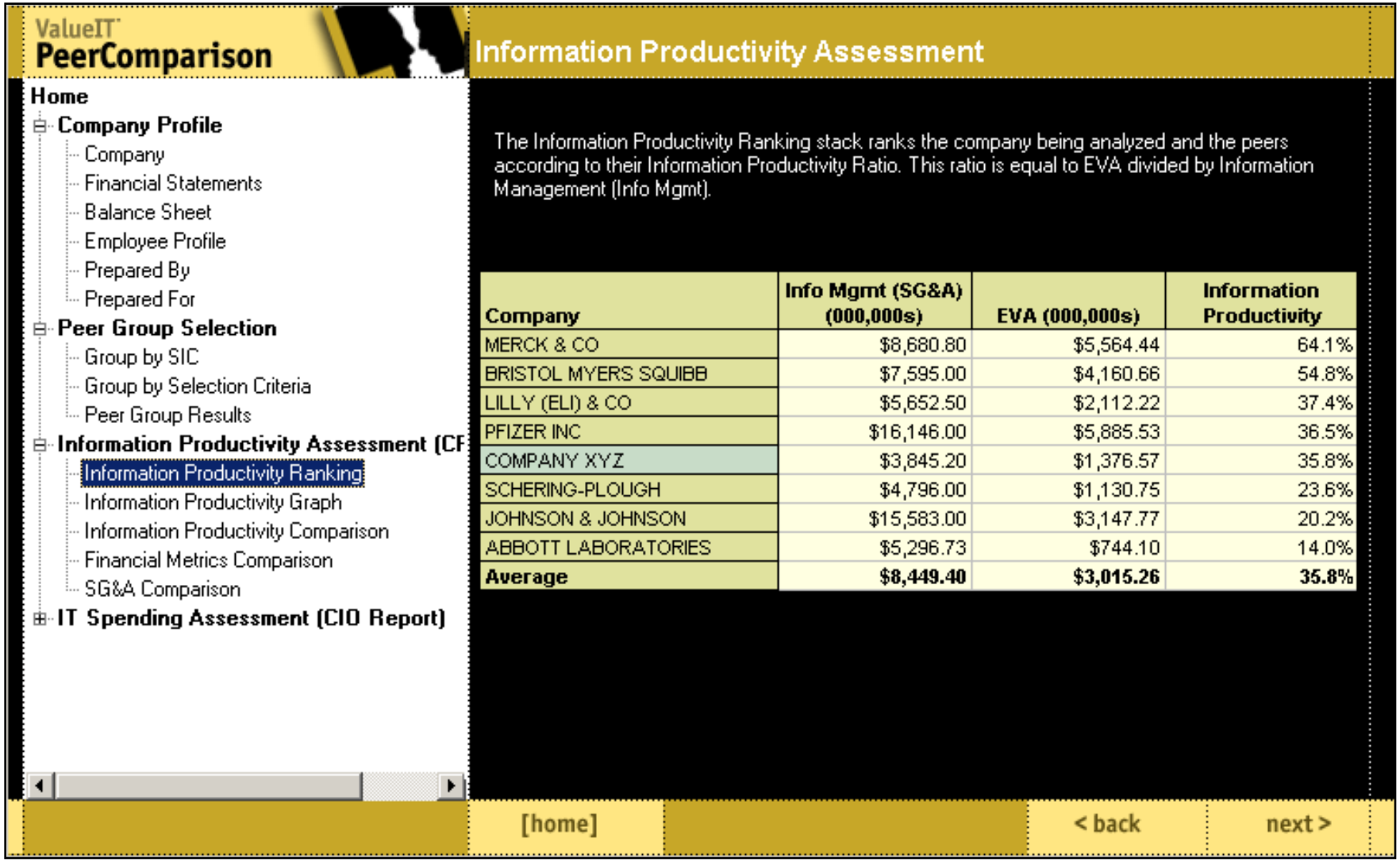
ValueIT Includes Information Productivity Benchmarking



Peer Group Selection Criteria for Benchmarking

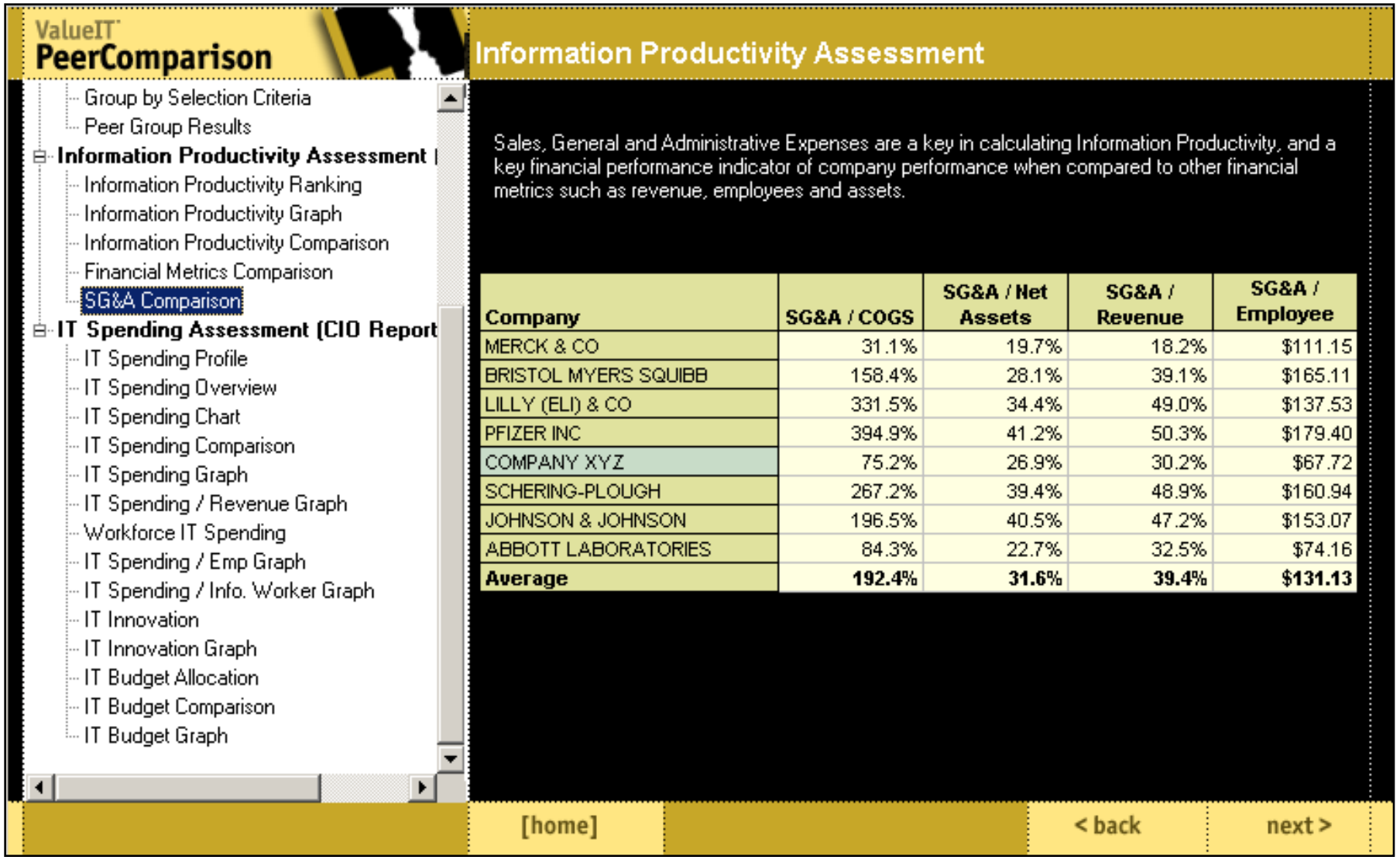


Information Productivity Assessments Calculated



Company	Info Mgmt (SG&A) (000,000s)	EVA (000,000s)	Information Productivity
MERCK & CO	$8,680.80	$5,564.44	64.1%
BRISTOL MYERS SQUIBB	$7,595.00	$4,160.66	54.8%
LILLY (ELI) & CO	$5,652.50	$2,112.22	37.4%
PFIZER INC	$16,146.00	$5,885.53	36.5%
COMPANY XYZ	$3,845.20	$1,376.57	35.8%
SCHERING-PLOUGH	$4,796.00	$1,130.75	23.6%
JOHNSON & JOHNSON	$15,583.00	$3,147.77	20.2%
ABBOTT LABORATORIES	$5,296.73	$744.10	14.0%
Average	**$8,449.40**	**$3,015.26**	**35.8%**

A Wide Range of Peer Comparisons Feasible



Company	SG&A / COGS	SG&A / Net Assets	SG&A / Revenue	SG&A / Employee
MERCK & CO	31.1%	19.7%	18.2%	$111.15
BRISTOL MYERS SQUIBB	158.4%	28.1%	39.1%	$165.11
LILLY (ELI) & CO	331.5%	34.4%	49.0%	$137.53
PFIZER INC	394.9%	41.2%	50.3%	$179.40
COMPANY XYZ	75.2%	26.9%	30.2%	$67.72
SCHERING-PLOUGH	267.2%	39.4%	48.9%	$160.94
JOHNSON & JOHNSON	196.5%	40.5%	47.2%	$153.07
ABBOTT LABORATORIES	84.3%	22.7%	32.5%	$74.16
Average	**192.4%**	**31.6%**	**39.4%**	**$131.13**